BUILD BETTER TOGETHER

The Phius Decision Room

Interactive Passive Building Scenarios



The Phius Decision Room: Interactive Passive Building Scenarios

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Build Zero Consulting is a building science and high-performance design consulting firm focused on helping project teams deliver durable, efficient, low-energy buildings. Our work includes Phius consulting, energy and hygrothermal modeling, enclosure analysis, and technical support from early design through construction and certification. We work across project types and climates, with a practical focus on balancing performance, constructability, cost, and real-world building operation.

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The Phius Decision Room: Interactive Passive Building Scenarios

Learning Objectives

1. Evaluate passive building project decisions through the lenses of performance, certification, cost, constructability, and risk.
2. Compare how different project-team roles may interpret the same passive building scenario and prioritize different outcomes.
3. Interpret live audience responses to recognize where passive building decisions are straightforward, contested, or dependent on project context.
4. Apply lessons from interactive project scenarios to improve passive building design, certification, and construction coordination.

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The Phius Decision Room: Interactive Passive Building Scenarios

The “Rules”

1. This is an interactive session
2. You are the Panel
3. Use the QR code to Vote along with the room.
   (You can also type in the link into your browser)
4. After questions are answered we will ask for volunteers to explain their answers or to offer any insight
5. Yes, there are Rewards!

pe.app/ryanabendroth

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Test Question

Respond using QR code or
pe.app/ryanabendroth

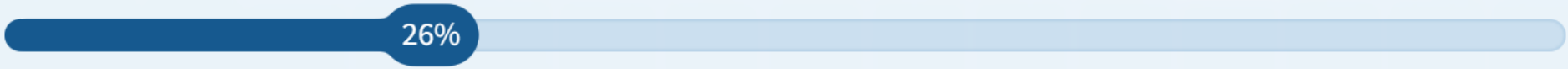
How many Phius projects have you worked on?

Test Question

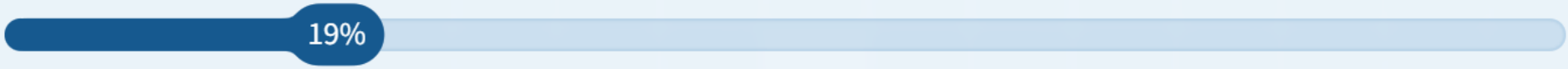
Respond using QR code or
pe.app/ryanabendroth

How many Phius projects have you worked on?

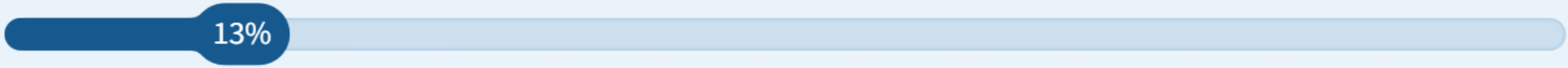
31



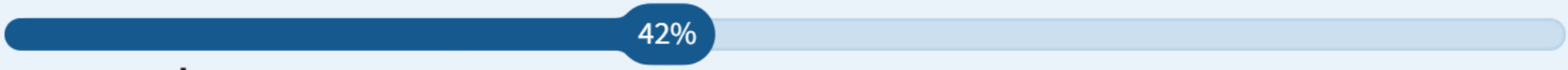
None Yet



1-2



3-5



More than 5

Edit

Choices Results Lock

The Phius Decision Room: Interactive Passive Building Scenarios

Let’s Begin!

pe.app/ryanabendroth

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Question 1

Respond using QR code or
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What are some conditions when heat loss to the ground is beneficial?

Question 1

Respond using QR code or
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What are some conditions when heat loss to the ground is beneficial?

31

During the cooling season, when the ground is cooler than the conditioned space

During a sunny winter day when a highly insulated building is overheating from solar gains

3%

In a building with high internal gains, even when outdoor temperatures are relatively cool

23%

In a cooling-dominated climate where ground temperatures remain below the indoor cooling setpoint for much of the year

74%

All of the above

Edit

Choices Results Lock

Question 2

Respond using QR code or
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What metric should be used to determine how much slab insulation to install for a given project?

Question 2

Respond using QR code or
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What metric should be used to determine how much slab insulation to install for a given project?

30

7%
Heating Demand

Cooling Demand

90%
Both Heating Demand and Cooling Demand

3%
Site Energy

Edit

Choices Results Lock

Question 3

Respond using QR code or
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What is the most optimal strategy for reducing thermal bridging at the footings for slab-on-grade single-family buildings?

Question 3

Respond using QR code or
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What is the most optimal strategy for reducing thermal bridging at the footings for slab-on-grade single-family buildings?

30

40%

Wrap around the entire footing and stem wall (if applicable) with foam insulation

7%

Use insulating aggregates, since you need compacted fill anyway

33%

Create a thermally broken transition between the slab insulation and wall insulation

20%

Insulate on the exterior, interior, or both faces of the perimeter stem wall.

Edit

Choices Results Lock

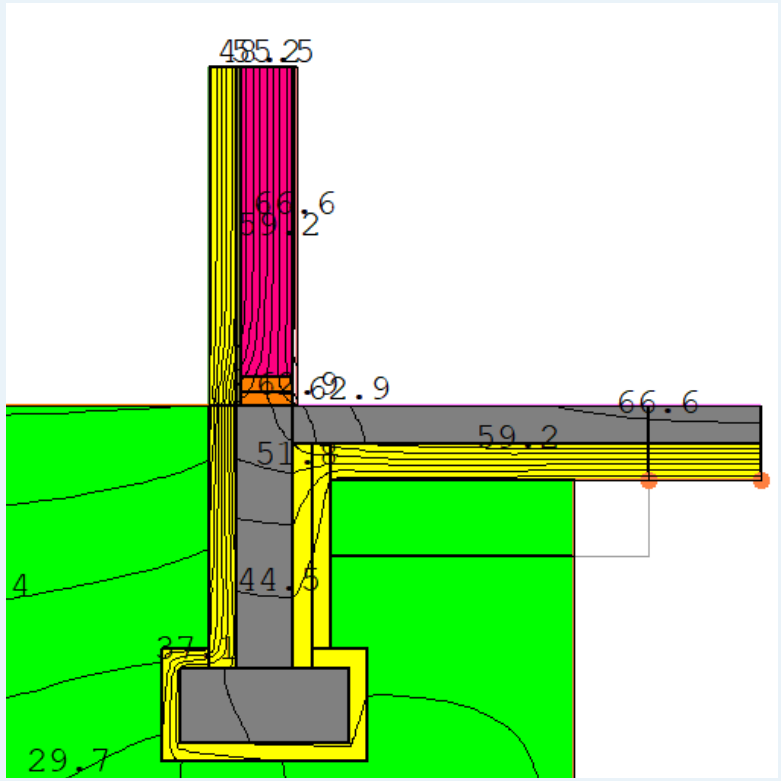
Question 3

Respond using QR code or
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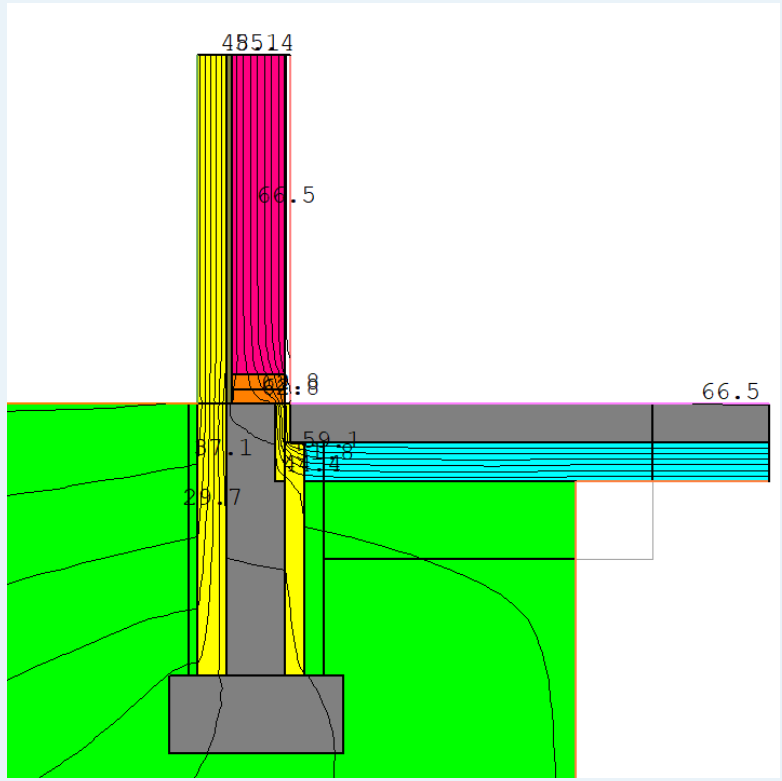
Ψ = 0.017

Ψ = 0.017 when gap is 1”

Ψ =0.061

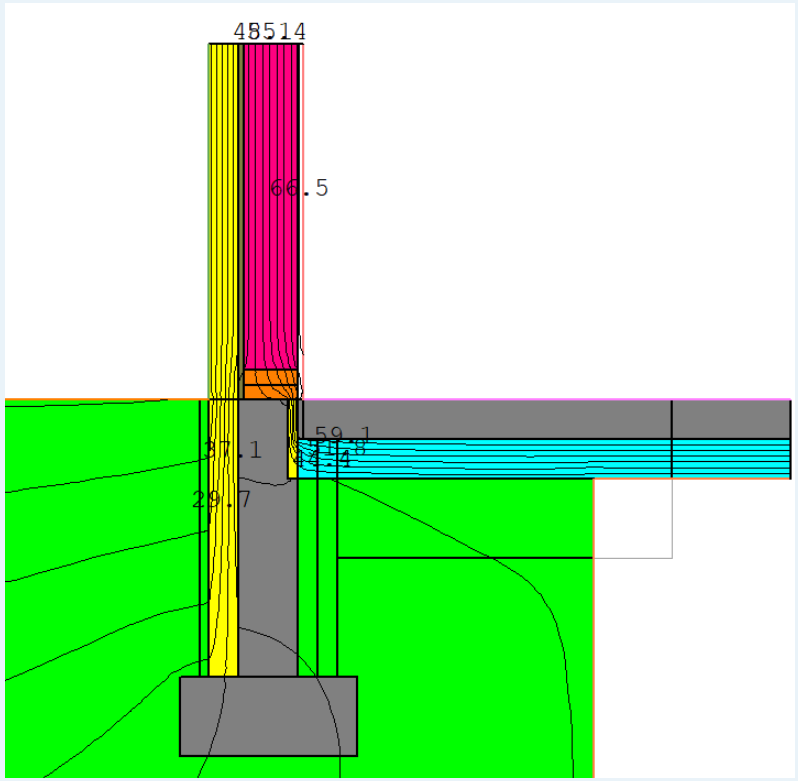


Exterior: 3”
Interior: 3”
Thermal Gap: 0”



Exterior: 3”
Interior: 2”
Thermal Gap: 1”

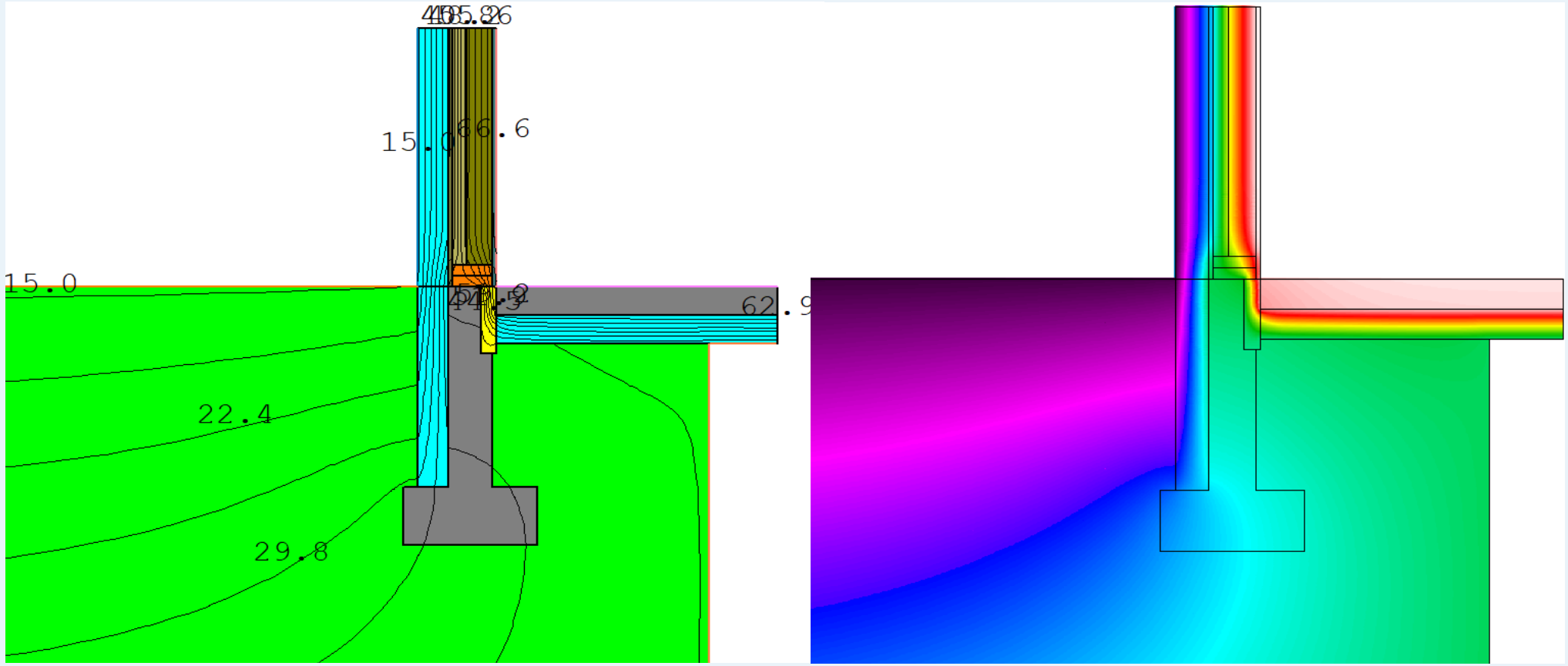
Ψ = 0.008



Exterior: 3”
Interior: 0”
Thermal Gap: 2”

Question 3

Respond using QR code or
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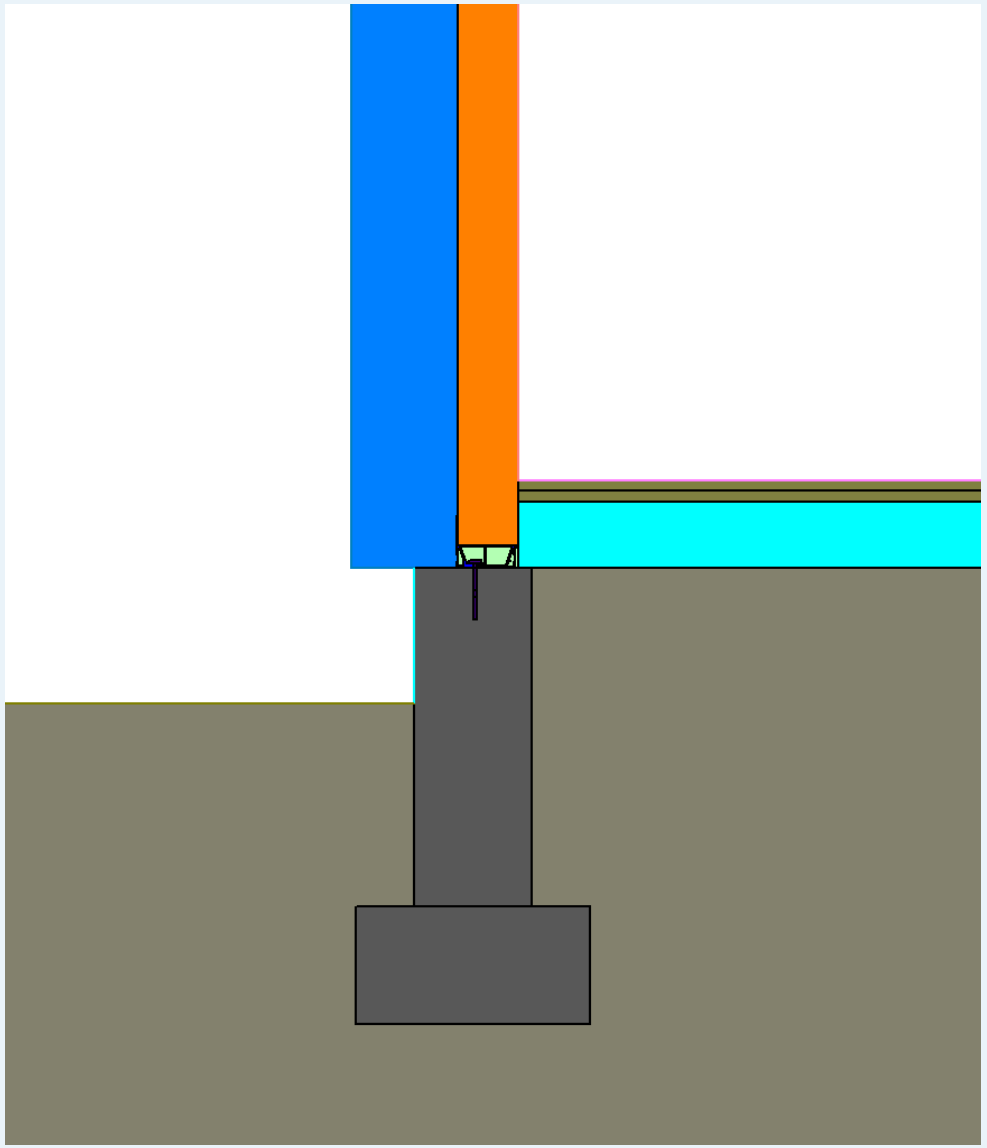


Final Detail:
Ψ = 0.004

Exterior: 4” EPS
Interior: 0”
Thermal Gap: 2”
Underslab: 4” EPS

Question 4

Respond using QR code or
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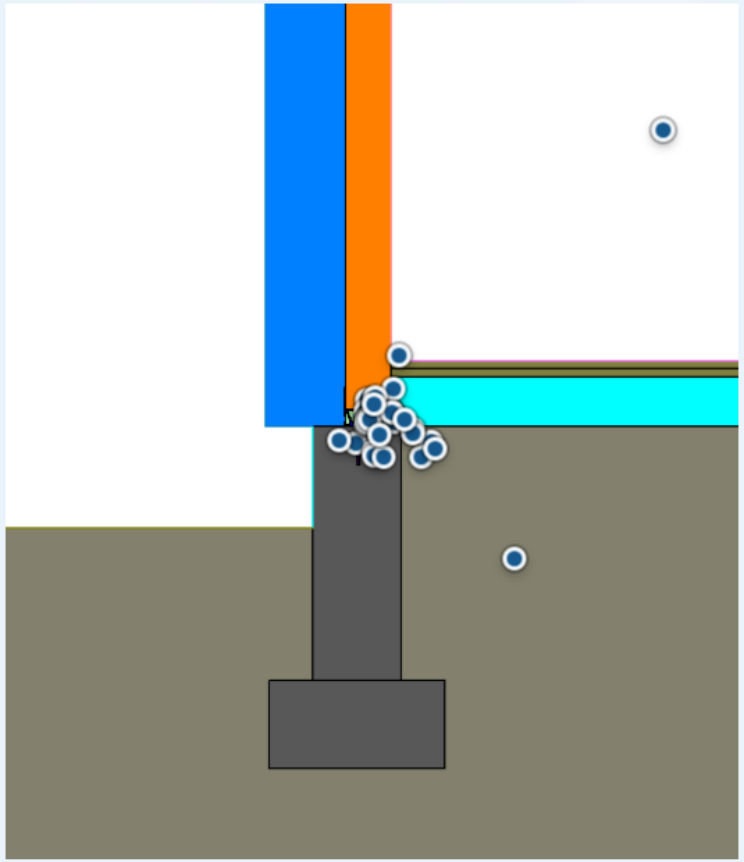
Mark the best location to break the thermal bridge

Question 4

Respond using QR code or
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Mark the best location to break the thermal bridge

22



Edit

Choices | Results | Lock

Question 5

Respond using QR code or
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Assume a project in a hot climate such as Houston, TX is concerned about thermal comfort and moisture performance at the slab to wall connection.

What changes should be made to the foundation insulation strategy?

Question 5

Respond using QR code or
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Assume a project in a hot climate such as Houston, TX is concerned about thermal comfort and moisture performance at the slab to wall connection.
What changes should be made to the foundation insulation strategy?

28

Insulation under the slab should be removed.

All foundation insulation should be removed

82%

Insulation under the slab should be removed, but slab edge insulation should be present to prevent issues during cold snaps

18%

None of this really matters

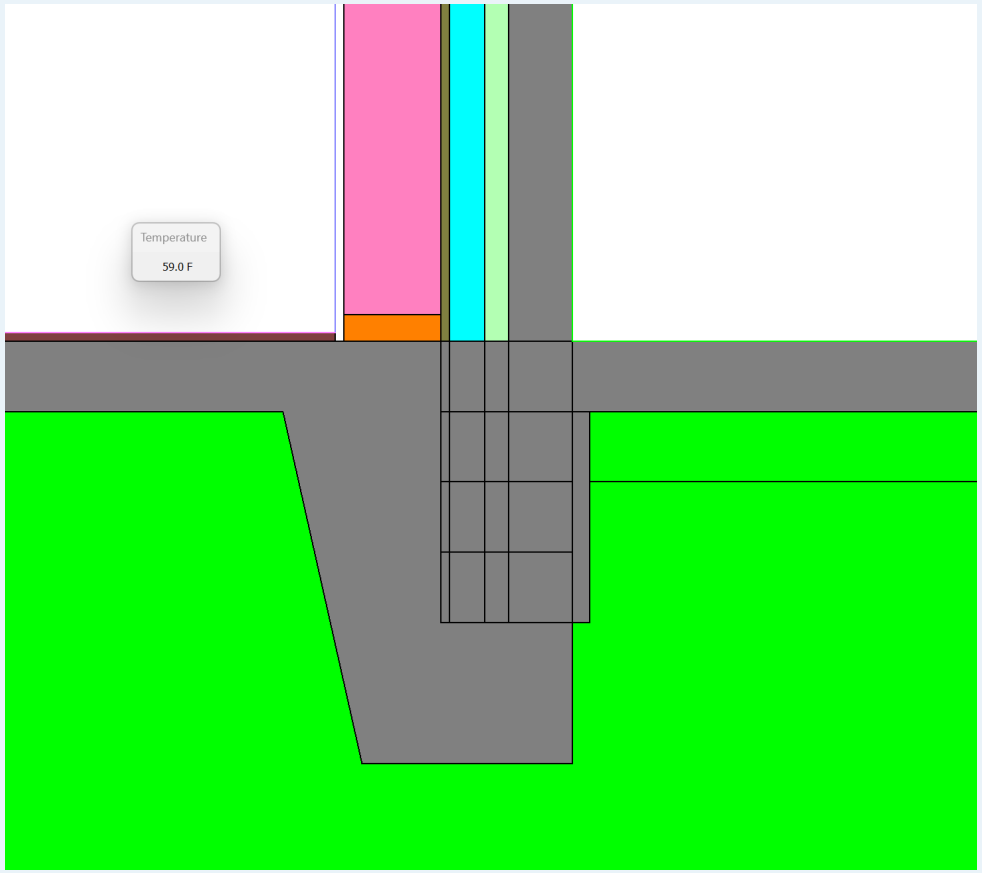
Edit

Choices Results Lock

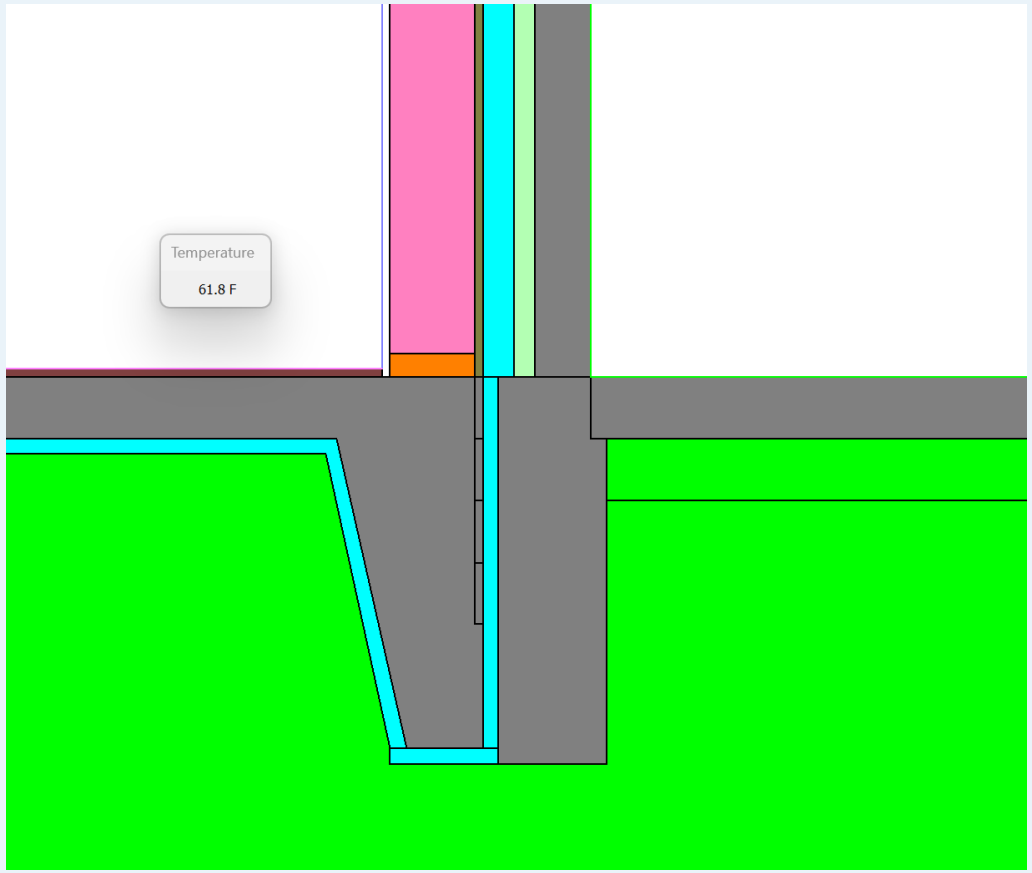
Question 5

Respond using QR code or
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Surface Temperature Change at Corner



Interior Corner Temperature:
59.0 F



Interior Corner Temperature:
61.8 F

Question 6

Respond using QR code or
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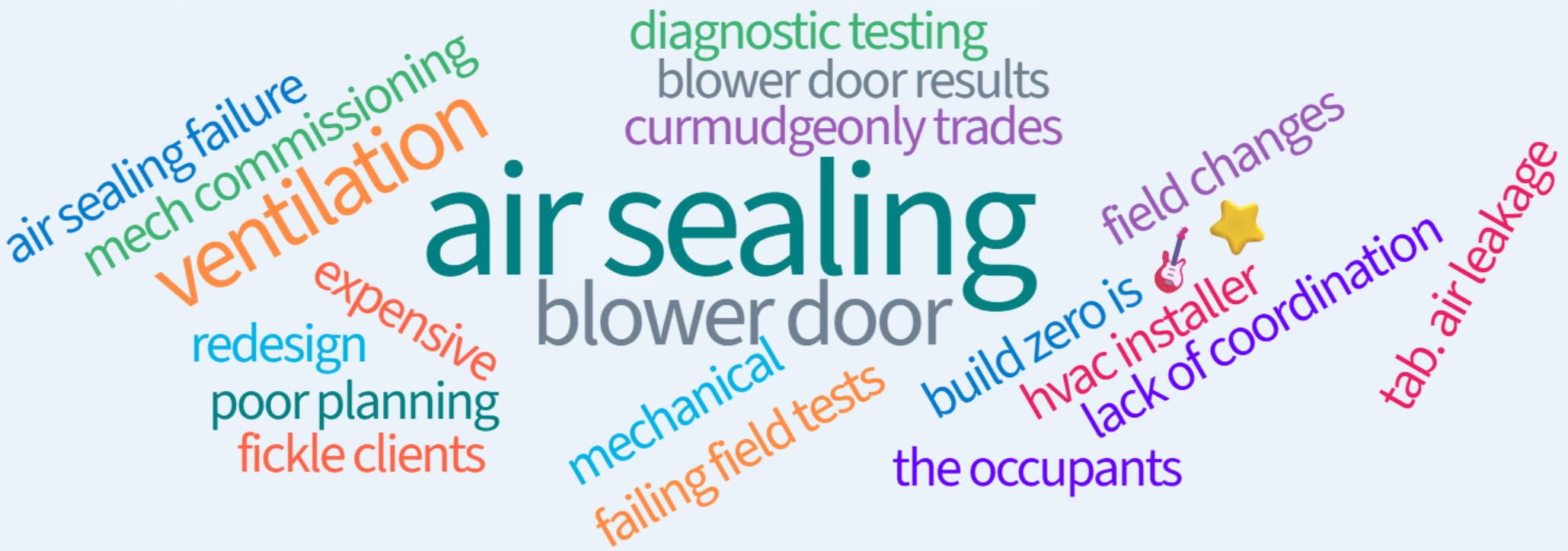
What causes the most problems late in a Phius project?

Question 6

Respond using QR code or
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What causes the most problems late in a Phius project?

21



Edit

Results

Lock

Question 7

Respond using QR code or
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You are adding interior insulation to an existing solid masonry building. Which approach gives you the best chance of ending up with a safe and durable assembly?

Question 7

Respond using QR code or pe.app/ryanabendroth

You are adding interior insulation to an existing solid masonry building. Which approach gives you the best chance of ending up with a safe and durable assembly?

25

Maximize the R-value and install a Class I vapor barrier on the interior

28%

Leave an air space between the masonry and insulation so the wall can dry

68%

Control rain first, maintain continuous air control, and verify the moisture behavior

4%

Use closed-cell spray foam directly against the masonry because it solves both the air and vapor control problems

Edit

Choices Results Lock

Question 8

Respond using QR code or
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Smart vapor membranes are often used in cold climates on the interior of an insulated assembly to reduce moisture risk. What happens if the interior humidity stays high for long periods of time, such as in a greenhouse or pool room?

Question 8

Respond using QR code or
pe.app/ryanabendroth

Smart vapor membranes are often used in cold climates on the interior of an insulated assembly to reduce moisture risk. What happens if the interior humidity stays high for long periods of time, such as in a greenhouse or pool room?

22

9%

The membrane becomes more vapor closed and provides additional protection

73%

The membrane can become more vapor open, allowing more moisture into the assembly when you may not want it

14%

The membrane actively regulates the humidity and keeps the assembly dry

5%

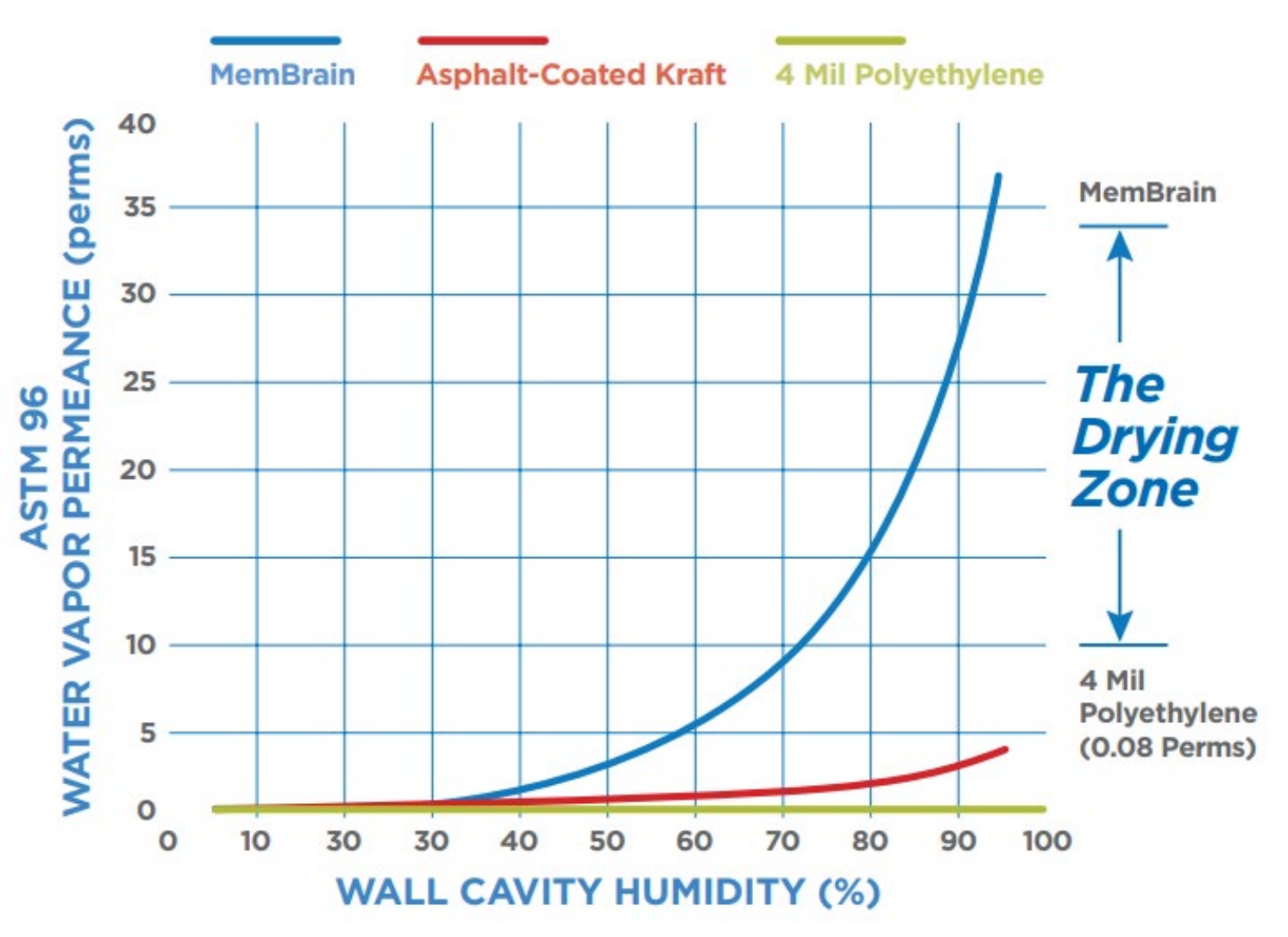
Nothing changes. Smart membranes respond primarily to outdoor temperature

Edit

Choices Results Lock

Question 8

Respond using QR code or
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Source: CertainTeed / Saint-Gobain, MemBrain™ Continuous Air Barrier & Smart Vapor Retarder Technical Brochure.

Question 9

Respond using QR code or
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You are designing a building in an area with significant wildfire risk. The client wants a foam-free enclosure with low embodied carbon, so you settle on a mineral-wool rainscreen. Which of the following can still become a weak point in the fire-resilience strategy?

Question 9

Respond using QR code or
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Which of the following can still become a weak point in the fire-resilience strategy?

23

The cladding

13%

The vented rainscreen cavity and opportunities for ember entry

The WRB, attachment system, cavity barriers, and other components behind the cladding

87%

All of the above

Edit

Choices Results Lock

Question 10

Respond using QR code or
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A project team wants to reduce the embodied carbon of the building. What information matters most when evaluating the carbon impact of a material change?

Question 10

Respond using QR code or pe.app/ryanabendroth

A project team wants to reduce the embodied carbon of the building. What information matters most when evaluating the carbon impact of a material change?

22

Whether the product is marketed as a low-carbon material

9%

The embodied carbon per unit of material

82%

The material quantity used and its carbon impact across the same parts of the life cycle

9%

Whether the product is locally sourced

Edit

Choices Results Lock

Question 11

Respond using QR code or
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A 283-unit mixed-use multifamily building was originally designed with ventilation rates of 85 CFM per unit, even though many of the units could be ventilated at a much lower rate.

How much does optimizing the ventilation airflow really matter to the energy model?

Question 11

Respond using QR code or
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A 283-unit mixed-use multifamily building was originally designed with ventilation rates of 85 CFM per unit, even though many of the units could be ventilated at a much lower rate.
How much does optimizing the ventilation airflow really matter to the energy model?

21

Very little. With a good ERV, the difference between 85 and 45-60 CFM/unit is almost negligible

5%

It mostly affects fan energy, but has little effect on heating demand or heating load

95%

It can have a significant impact because a relatively small amount of excess airflow per unit becomes a very large continuous load across hundreds of apartments

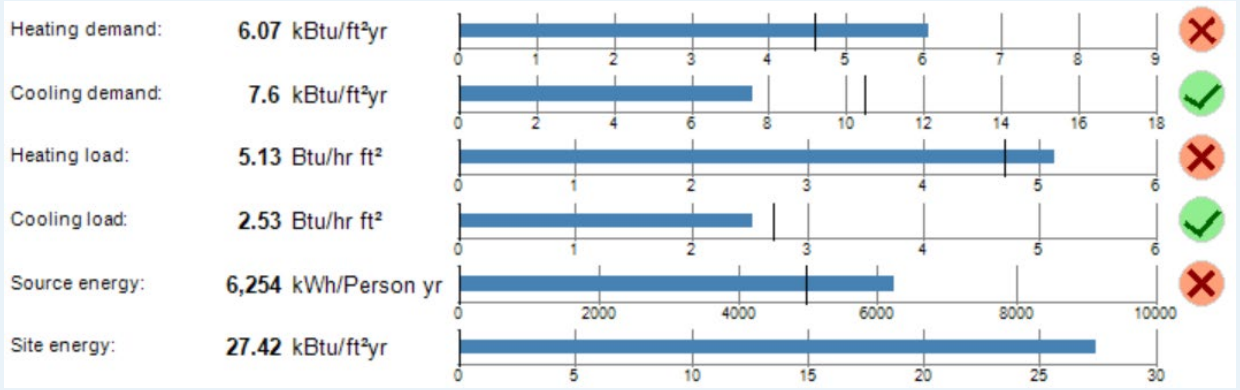
Lower airflow helps source energy, but generally increases heating demand because less heat is recovered

Edit

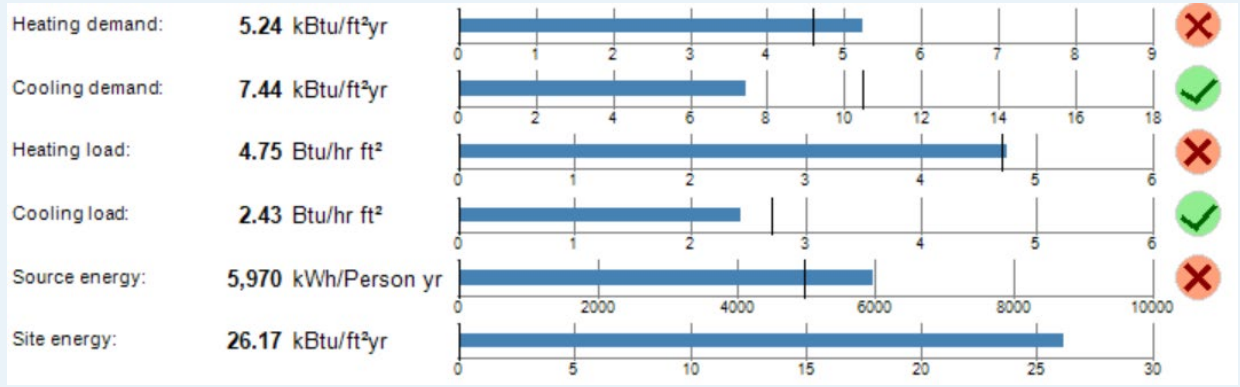
Choices Results Lock

Question 11

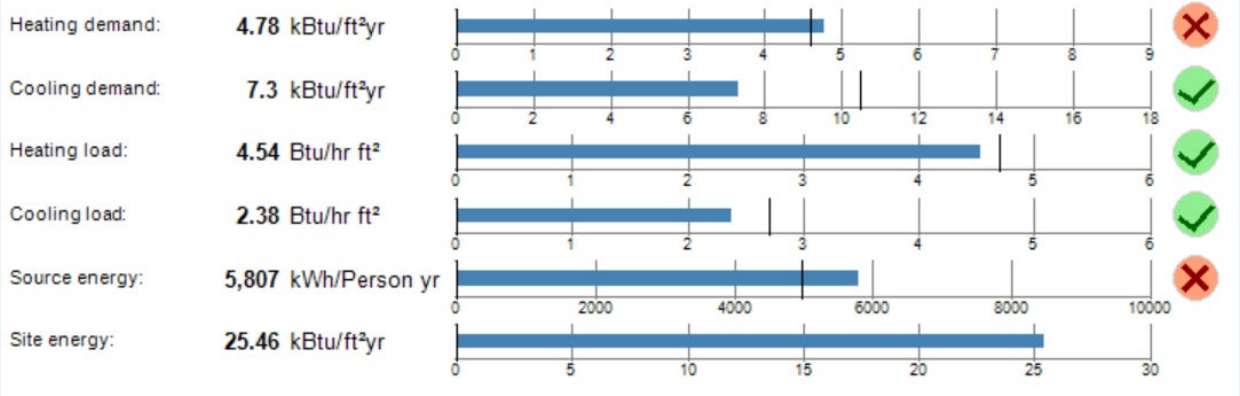
Respond using QR code or
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As Designed:
85 CFM/unit



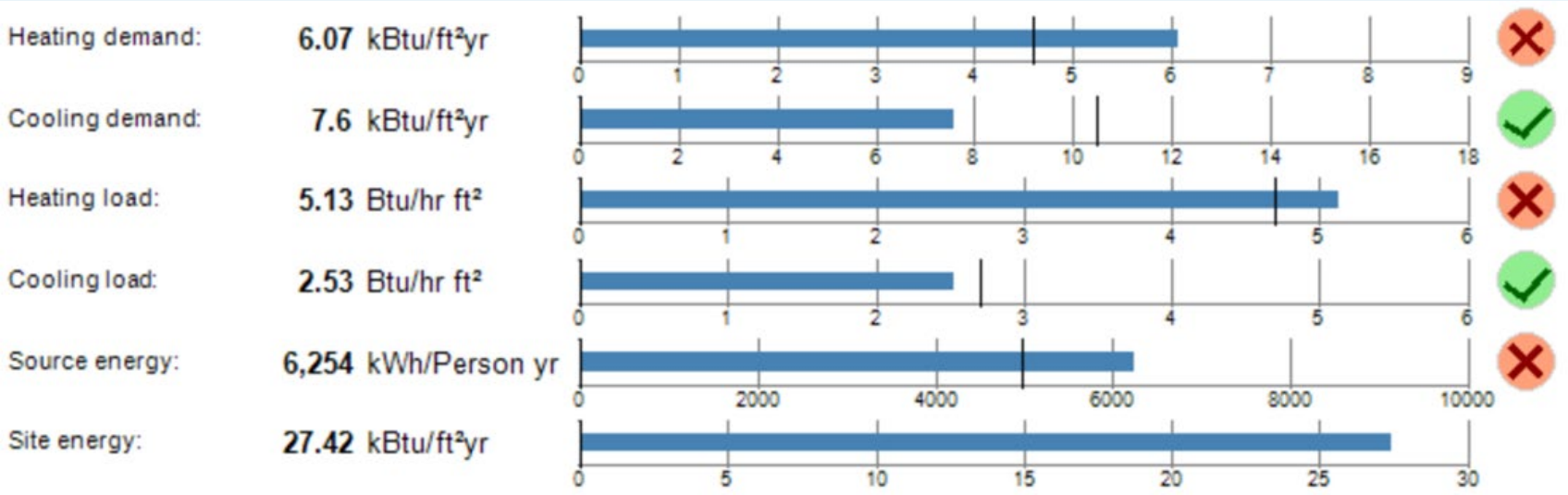
Optimized:
60 CFM/unit



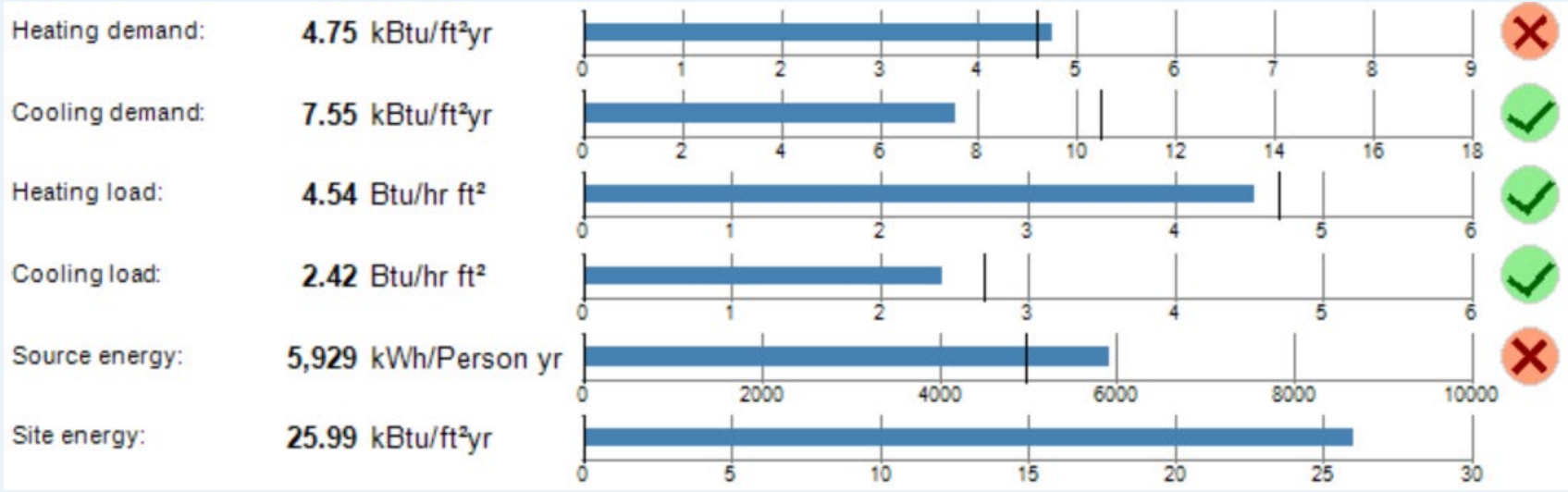
Code Minimum:
45 CFM/unit

Question 11

Respond using QR code or
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As Designed:
85 CFM/unit
SRE: 75 %
NMT: 60 %
FAN: .8 w/cfm



Optimized Airflow and SRE:
60 CFM/unit
SRE: 81 %
NMT: 60 %
FAN: .8 w/cfm

Question 23

Respond using QR code or
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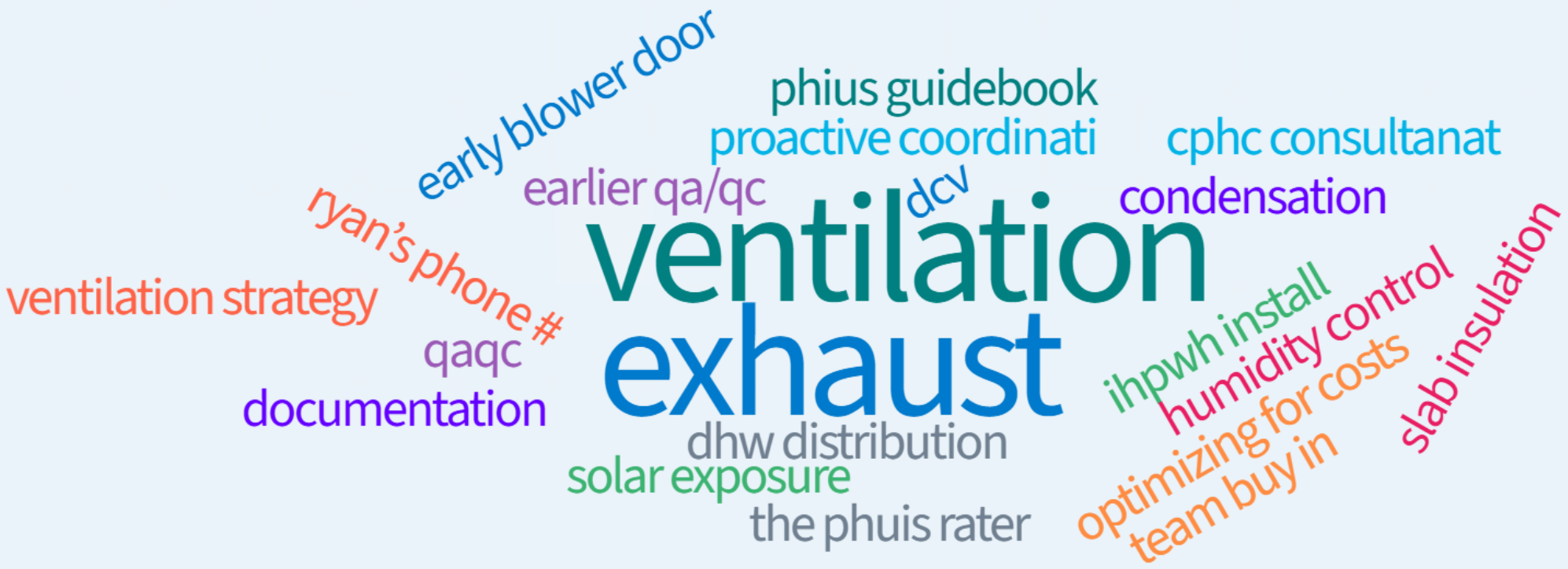
What will you pay more attention to on your next high-performance project?

Question 23

Respond using QR code or
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What will you pay more attention to on your next high-performance project?

18



Edit

Results

Lock

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Questions?

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stefan@buildzeroconsulting.com

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